

Lightweight Aerogel Structural and Insulation Materials, Phase I

Completed Technology Project (2007 - 2007)



Project Introduction

The Exploration Systems architecture presents some propulsion challenges that require new technologies to be developed. To solve these challenges, NASA needs new technologies for long term cryogenic propellant storage, management and acquisition applications in-space as well as on the lunar surface. These technologies will impact cryogenic systems for space transportation orbit transfer vehicles, space power systems, spaceports, spacesuits, lunar habitation systems, robotics, and in situ propellant systems. The sizes of these systems range from the small (< 20 m³ for supercritical air and payload cooling) to very large (> 3400 m³ for LOX and LH2 propellant storage). Advanced materials are needed to help solve the unique requirements of these small to very large storage systems. Thus, this SBIR project will focus on improving the strength of aerogels which are the lightest weight and best insulation material known. Improvements in the strength of aerogels would allow these materials to be used as advanced insulation materials capable of retaining structural integrity while accommodating large operating temperatures ranging from cryogenic to elevated temperatures. The properties of the aerogels will be tailored by controlling their densities and strengthened by reinforcing them with fibers and modifying the aerogel framework with organic crosslinking agents.

Anticipated Benefits

The aerogels developed in this project would find applications as the insulation used for LNG storage containers as well as for other cryogenic fluids. Lightweight structural aerogels would find applications as a component of composite sandwich panels that are both lightweight and insulating. Such panels could find many applications including uses in energy efficient buildings. The aerogel-based materials will have applications as cryogenic insulation and as lightweight structural components for composite cryogenic tanks.



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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Kennedy Space Center (KSC)

Responsible Program:

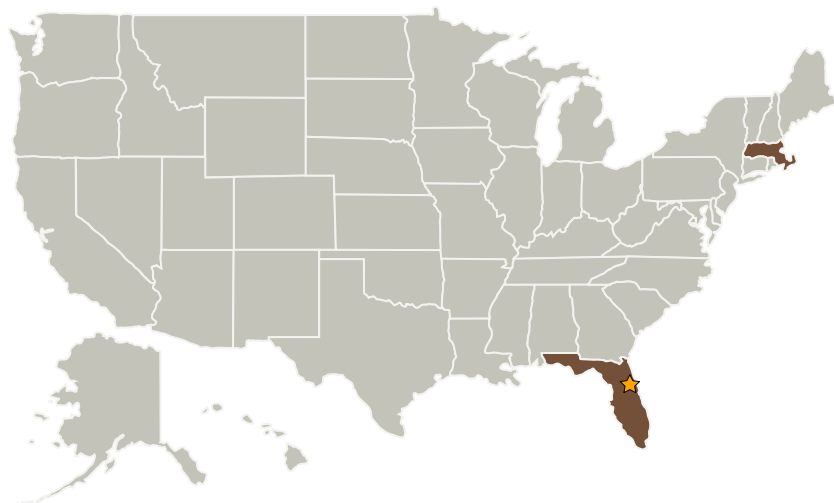
Small Business Innovation Research/Small Business Tech Transfer

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Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
★ Kennedy Space Center(KSC)	Lead Organization	NASA Center	Kennedy Space Center, Florida
Aspen Aerogels, Inc.	Supporting Organization	Industry	Northborough, Massachusetts

Primary U.S. Work Locations

Florida	Massachusetts
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Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Project Manager:

William W Mcquade

Principal Investigator:

Wendell Rhine

Technology Areas

Primary:

- TX14 Thermal Management Systems
 - └ TX14.1 Cryogenic Systems
 - └ TX14.1.1 In-space Propellant Storage & Utilization